Tensorial products of functional ARMA processes. Application to estimation of covariance functions

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Abstract

We study the structure of tensorial products of functional ARMA processes. One of the motivations is autocovariance estimation by empirical autocovariance. For convenience, we focus on standard functional autoregressive and moving average processes with innovations that are martingale increments. The obtained models are functional ARMA $\mathcal{S}$ processes, possibly nonstandard, where $\mathcal{S}$ denotes the space of Hilbert-Schmidt operators. We give some examples and provide criteria for standardness of the tensorial product. As an application, we indicate the asymptotic behaviour of the empirical covariance for a continuous time process.